

Claims:

1. A cell delivery composition comprising:
 - a) a progenitor cell; and
 - b) a targeting moiety that binds to a target tissue,
- 5 wherein said targeting moiety selectively directs the progenitor cell to the target tissue.
2. The composition of claim 1, wherein the progenitor cell is selected from the group consisting of a totipotent stem cell, pluripotent stem cell, multipotent stem cell, mesenchymal stem cell, neuronal stem cell, hematopoietic stem
- 10 cell, pancreatic stem cell, cardiac stem cell, embryonic stem cell, embryonic germ cell, neural crest stem cell, kidney stem cell, hepatic stem cell, lung stem cell, hemangioblast cell, and endothelial progenitor cell.
3. The composition of claim 1, wherein the progenitor cell is derived from a de-differentiated chondrogenic cell, myogenic cell, osteogenic cell, tendogenic
- 15 cell, ligamentogenic cell, adipogenic cell, and dermatogenic cell.
4. The composition of any of claims 1-3, wherein said progenitor cell is pre-coated with a linker.
5. The composition of claim 4, wherein said linker is selected from the group consisting of protein G and protein A.
- 20 6. The composition of claim 4, wherein said linker is modified with a lipophilic moiety.
7. The composition of claim 6, wherein said lipophilic moiety is selected from palmitoyl moiety, myristoyl moiety, margaroyl moiety, stearoyl moiety, arachidoyl moiety, acetyl moiety, butyryl moiety, hexanoyl moiety, octanoyl
- 25 moiety, decanoyl moiety, lauroyl moiety, palmitoleoyl moiety, behenoyl moiety, and lignoceroyl moiety.

8. The composition of claim 1, wherein said progenitor cell is directly linked to said targeting moiety.
9. The composition of claim 8, wherein said targeting moiety is modified with a lipophilic moiety.
- 5 10. The composition of claim 9, wherein said lipophilic moiety is selected from palmitoyl moiety, myristoyl moiety, margaroyl moiety, stearoyl moiety, arachidoyl moiety, acetyl moiety, butyryl moiety, hexanoyl moiety, octanoyl moiety, decanoyl moiety, lauroyl moiety, palmitoleoyl moiety, behenoyl moiety, and lignoceroyl moiety.
- 10 11. The composition of any of claims 1-3, wherein said progenitor cell expresses a cell surface marker or an extracellular matrix molecule.
12. The composition of claim 11, wherein said cell surface marker or extracellular matrix molecule is selected from the group consisting of CD4, CD8, CD10, CD30, CD33, CD34, CD38, CD45, CD133, CD146, fetal liver
15 kinase-1 (Flk1), C-Kit, Lin, Mac-1, Sca-1, Stro-1, Thy-1, Collagen types II or IV, O1, O4, N-CAM, p75, and SSEA.
13. The composition of claim 1, wherein said targeting moiety comprises a component of a specific binding pair.
14. The composition of claim 1, wherein said targeting moiety interacts with an
20 epitope intrinsic to the target tissue.
15. The composition of claim 14, wherein the epitope is a protein or carbohydrate epitope of the target tissue.
16. The composition of claim 15, wherein the carbohydrate epitope is within a complex carbohydrate.

17. The composition of claim 16, wherein the complex carbohydrate binds to a lectin.
18. The composition of claim 16, wherein the complex carbohydrate is a proteoglycan.
- 5 19. The composition of claim 18, wherein the proteoglycan is selected from the group consisting of chondroitin sulfate, dermatan sulfate, heparin, heparan sulfate, hyaluronate, and keratan sulfate.
20. The composition of claim 1, wherein said targeting moiety comprises a homing peptide.
- 10 21. The composition of claim 20, wherein said homing peptide comprises a sequence selected from PWERSL, FMLRDR, and SGLRQR, and target to bone marrow tissues.
22. The composition of claim 20, wherein said homing peptide comprises a sequence of ASSLNIA, and targets to muscle tissues.
- 15 23. The composition of claim 20, wherein said homing peptide comprises a sequence of YSGKWW, and targets to intestine.
24. The composition of claim 20, wherein said homing peptide comprises a sequence selected from CGFELETC and CGFECVRQCPERC, and targets to lung tissues.
- 20 25. The composition of claim 20, wherein said homing peptide selectively directs the progenitor cell to the target tissue.
26. The composition of claim 1, wherein said targeting moiety comprises an antibody.

27. The composition of claim 26, wherein said antibody is selected from antibodies to type II collagen, chondroitin-4-sulfate, and dermatan sulfate.
28. The composition of claim 26, wherein said antibody is selected from antibodies to collagens I, V, VI and IX, and condroitin-6-sulfate.
- 5 29. The composition of any of claims 26-28, wherein said antibody is a monoclonal antibody.
30. The composition of any of claims 26-28, wherein said antibody is a polyclonal antibody.
31. The composition of any of claims 26-28, wherein said antibody is a
10 humanized antibody.
32. The composition of claim 1, wherein said targeting moiety is a fusion protein.
33. The composition of claim 32, wherein said fusion protein comprises an Fc fragment.
- 15 34. The composition of claim 32, wherein said fusion protein comprises a homing peptide.
35. The composition of claim 1, wherein said targeting moiety comprises a receptor or a ligand.
36. The composition of claim 35, wherein said receptor is a chemokine receptor.
- 20 37. The composition of claim 1, wherein said targeting moiety comprises an aptamer.
38. The composition of claim 1, wherein said targeting moiety is a peptidomimetic.

39. The composition of claim 1, wherein the target tissue is selected from neuronal tissue, connective tissue, hepatic tissue, pancreatic tissue, kidney tissue, bone marrow tissue, cardiac tissue, retinal tissue, intestinal tissue, lung tissue, and endothelium tissue.
- 5 40. The composition of claim 1, wherein the target tissue is selected from cartilage, skeletal muscle, cardiac muscle, and smooth muscle, bone, tendon, ligament, adipose tissue, and skin.
41. The composition of any of claims 1-3, further comprising a bioactive factor.
- 10 42. The composition of claim 40, wherein the bioactive factor is selected from a transforming growth factor, a bone morphogenetic protein, a cartilage-derived morphogenetic protein, a growth differentiation factor, an angiogenic factor, a platelet-derived growth factor, a vascular endothelial growth factor, an epidermal growth factor, a fibroblast growth factor, a hepatocyte growth factor, an insulin-like growth factor, a nerve growth factor, a colony-stimulating factor, a neurotrophin, a growth hormone, an interleukin, a connective tissue growth factor, a parathyroid hormone-related protein, a chemokine, a Wnt protein, a Noggin, and a Gremlin.
- 15 43. A method of delivering a progenitor cell to a target tissue in a subject, comprising:
- 20 a) coating a progenitor cell with a linker;
- b) contacting the coated progenitor cell with a targeting moiety that binds to the linker and can then bind to the target tissue; and
- c) administering the progenitor cell complexed with the targeting moiety to a subject,
- 25 wherein said targeting moiety selectively directs the progenitor cell to the target tissue.
44. A method of delivering a progenitor cell to a target tissue in a subject, comprising:

- a) coating the progenitor cell with a targeting moiety that binds to a target tissue and the progenitor cell; and
- b) administering the progenitor cell complexed with the targeting moiety to a subject,
- 5 wherein said targeting moiety selectively directs the progenitor cell to the target tissue.
45. The method of claim 43 or 44, wherein the progenitor cell is selected from a totipotent stem cell, pluripotent stem cell, multipotent stem cell, mesenchymal stem cell, neuronal stem cell, hematopoietic stem cell,
- 10 pancreatic stem cell, cardiac stem cell, embryonic stem cell, embryonic germ cell, neural crest stem cell, kidney stem cell, hepatic stem cell, lung stem cell, hemangioblast cell, and endothelial progenitor cell.
46. The method of claim 43 or 44, wherein the progenitor cell is derived from a de-differentiated chondrogenic cell, myogenic cell, osteogenic cell,
- 15 tendogenic cell, ligamentogenic cell, adipogenic cell, and dermatogenic cell.
47. The method of claim 43, wherein said linker is selected from protein G and protein A.
48. The method of claim 43, wherein said linker is modified with a lipophilic moiety.
- 20 49. The method of claim 48, wherein said lipophilic moiety is selected from palmitoyl moiety, myristoyl moiety, margaroyl moiety, stearoyl moiety, arachidoyl moiety, acetyl moiety, butyryl moiety, hexanoyl moiety, octanoyl moiety, decanoyl moiety, lauroyl moiety, palmitoleoyl moiety, behenoyl moiety, and lignoceroyl moiety.
- 25 50. The method of claim 44, wherein said targeting moiety is modified with a lipophilic moiety.

51. The method of claim 50, wherein said lipophilic moiety is selected from palmitoyl moiety, myristoyl moiety, margaroyl moiety, stearoyl moiety, arachidoyl moiety, acetyl moiety, butyryl moiety, hexanoyl moiety, octanoyl moiety, decanoyl moiety, lauroyl moiety, palmitoleoyl moiety, behenoyl moiety, and lignoceroyl moiety.
52. The method of claim 43 or 44, wherein said progenitor cell expresses a cell surface marker or an extracellular matrix molecule.
53. The method of claim 52, wherein said cell surface marker or extracellular matrix molecule is selected from CD4, CD8, CD10, CD30, CD33, CD34, CD38, CD45, CD133, CD146, fetal liver kinase-1 (Flk1), C-Kit, Lin, Mac-1, Sca-1, Stro-1, Thy-1, Collagen types II or IV, O1, O4, N-CAM, p75, and SSEA.
54. The method of claim 43 or 44, wherein said targeting moiety comprises a component of a specific binding pair.
55. The method of claim 43 or 44, wherein said targeting moiety interacts with an epitope intrinsic to the target tissue.
56. The method of claim 55, wherein the epitope is a protein or carbohydrate epitope of the target tissue.
57. The method of claim 56, wherein the carbohydrate epitope is within a complex carbohydrate.
58. The method of claim 57, wherein the complex carbohydrate binds to a lectin.
59. The method of claim 57, wherein the complex carbohydrate is a proteoglycan.

60. The method of claim 59, wherein the proteoglycan is selected from the group consisting of chondroitin sulfate, dermatan sulfate, heparin, heparan sulfate, hyaluronate, and keratan sulfate.
- 5 61. The method of claim 43 or 44, wherein said targeting moiety comprises a homing peptide.
62. The method of claim 61, wherein said homing peptide comprises a sequence selected from PWERSL, FMLRDR, and SGLRQR, and target to bone marrow tissues.
- 10 63. The method of claim 61, wherein said homing peptide comprises a sequence of ASSLNIA, and targets to muscle tissues.
64. The method of claim 61, wherein said homing peptide comprises a sequence of YSGKWW, and targets to intestine.
- 15 65. The method of claim 61, wherein said homing peptide comprises a sequence selected from CGFELETC and CGFECVRQCPERC, and targets to lung tissues.
66. The method of claim 61, wherein said homing peptide selectively directs the progenitor cell to the target tissue.
67. The method of claim 43 or 44, wherein said targeting moiety comprises an antibody.
- 20 68. The method of claim 67, wherein said antibody is selected from antibodies to type II collagen, chondroitin-4-sulfate, and dermatan sulfate.
69. The method of claim 67, wherein said antibody is selected from antibodies to collagens I, V, VI and IX, and chondroitin-6-sulfate.

70. The method of claim 67, wherein said antibody is a monoclonal antibody.
71. The method of claim 67, wherein said antibody is a polyclonal antibody.
72. The method of claim 67, wherein said antibody is a humanized antibody.
73. The method of claim 43 or 44, wherein said targeting moiety is a fusion
5 protein.
74. The method of claim 73, wherein said fusion protein comprises an Fc
fragment.
75. The method of claim 73, wherein said fusion protein comprises a homing
peptide.
- 10 76. The method of claim 43 or 44, wherein said targeting moiety comprises a
receptor or a ligand.
77. The method of claim 76, wherein said receptor is a chemokine receptor.
78. The method of claim 43 or 44, wherein said targeting moiety comprises an
aptamer.
- 15 79. The method of claim 43 or 44, wherein said targeting moiety is a
peptidomimetic.
80. The method of claim 43 or 44, wherein the target tissue is selected from
neuronal tissue, connective tissue, hepatic tissue, pancreatic tissue, kidney
tissue, bone marrow tissue, cardiac tissue, retinal tissue, intestinal tissue,
20 lung tissue, and endothelium tissue.
81. The method of claim 43 or 44, wherein the target tissue is selected from
cartilage, skeletal muscle, cardiac muscle, and smooth muscle, bone, tendon,
ligament, adipose tissue, and skin.

82. The method of claim 43 or 44 wherein the progenitor cell is treated with a bioactive factor.
83. The method of claim 82, wherein the bioactive factor is selected from a transforming growth factor, a bone morphogenetic protein, a cartilage-derived morphogenetic protein, a growth differentiation factor, an angiogenic factor, a platelet-derived growth factor, a vascular endothelial growth factor, an epidermal growth factor, a fibroblast growth factor, a hepatocyte growth factor, an insulin-like growth factor, a nerve growth factor, a colony-stimulating factor, a neurotrophin, a growth hormone, an interleukin, a connective tissue growth factor, a parathyroid hormone-related protein, a chemokine, a Wnt protein, a Noggin, and a Gremlin.
84. The method of claim 43 or 44, wherein the progenitor cell complexed with the targeting moiety is delivered to the subject by injection into blood.
85. The method of claim 43 or 44, wherein the progenitor cell complexed with the targeting moiety is delivered to the subject by injection into the target tissue.
86. The method of claim 43 or 44, wherein the progenitor cell complexed with the targeting moiety is delivered to the subject by surgical implantation.
87. The method of claim 43 or 44, wherein the progenitor cell complexed with the targeting moiety is delivered to the subject by subcutaneous injection.
88. The method of claim 43 or 44, wherein the progenitor cell complexed with the targeting moiety is delivered to the subject by intra-peritoneal injection.
89. The method of claim 43 or 44, wherein the progenitor cell complexed with the targeting moiety is delivered to the subject by intra-synovial injection.
90. A method of treating a disease or a tissue injury, comprising:

- a) providing a progenitor cell linked to a targeting moiety, wherein the targeting moiety selectively directs the progenitor cell to a diseased or injured target tissue; and
- b) delivering the progenitor cell linked with the targeting moiety to the diseased or injured target tissue.
- 5
91. The method of claim 90, wherein the progenitor cell is selected from the group consisting of a totipotent stem cell, pluripotent stem cell, multipotent stem cell, mesenchymal stem cell, neuronal stem cell, hematopoietic stem cell, pancreatic stem cell, cardiac stem cell, embryonic stem cell, embryonic germ cell, neural crest stem cell, kidney stem cell, hepatic stem cell, lung stem cell, hemangioblast cell, and endothelial progenitor cell.
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92. The method of claim 90, wherein the progenitor cell is derived from a de-differentiated chondrogenic cell, myogenic cell, osteogenic cell, tendogenic cell, ligamentogenic cell, adipogenic cell, and dermatogenic cell.
- 15
93. The method of claim 90, wherein the target tissue is selected from neuronal tissue, connective tissue, hepatic tissue, pancreatic tissue, kidney tissue, bone marrow tissue, cardiac tissue, retinal tissue, intestinal tissue, lung tissue, and endothelium tissue.
- 20
94. The method of claim 90, wherein the target tissue is selected from cartilage, skeletal muscle, cardiac muscle, and smooth muscle, bone, tendon, ligament, adipose tissue, and skin.
- 25
95. The method of claim 90, for treating a disease or an injury selected from diabetes, cardiovascular disease, amyotrophic lateral sclerosis, Parkinson's disease, Huntington's disease, multiple sclerosis, stroke, myocardial infarction, spinal cord injury, brain injury, peripheral neuropathy, autoimmune diseases, liver based metabolic diseases, acute liver failure, chronic liver disease, leukemia, sickle-cell anemia, bone defects, muscular dystrophy, burns, osteoarthritis, and macular degeneration.

96. A tissue engineering composition, comprising:
- a) a progenitor cell;
 - b) a targeting moiety that binds to a target tissue; and
 - c) a biocompatible scaffold,
- 5 wherein the tissue engineering composition generates a scaffold graft to be delivered to a target tissue.
97. The composition of claim 96, wherein the scaffold comprises a bioresorbable material.
98. The composition of claim 97, wherein the bioresorbable material comprises
10 at least one molecule selected from a hydroxy acid, a glycolic acid, caprolactone, hydroxybutyrate, dioxanone, an orthoester, an orthocarbonate, or an aminocarbonate, collagen, cellulose, fibrin, hyaluronic acid, fibronectin, chitosan.
99. The composition of claim 96, wherein the scaffold comprises a non-
15 bioresorbable material.
100. The composition of claim 99, wherein the non-bioresorbable material comprises at least one molecule selected from a polyalkylene terephthalate, a polyamide, a polyalkene, poly(vinyl fluoride), polytetrafluoroethylene carbon fibers, natural or synthetic silk, carbon fiber, and glass.
- 20 101. The composition of any of claims 96, 97, and 99, further comprising a bioactive factor.
102. The composition of claim 101, wherein the bioactive factor is selected from a
25 transforming growth factor, a bone morphogenetic protein, a cartilage-derived morphogenetic protein, a growth differentiation factor, an angiogenic factor, a platelet-derived growth factor, a vascular endothelial growth factor, an epidermal growth factor, a fibroblast growth factor, a hepatocyte growth

factor, an insulin-like growth factor, a nerve growth factor, a colony-stimulating factor, a neurotrophin, a growth hormone, an interleukin, a connective tissue growth factor, a parathyroid hormone-related protein, a chemokine, a Wnt protein, a Noggin, and a Gremlin.

- 5 103. The composition of claim 96, wherein the progenitor cell is selected from the group consisting of a totipotent stem cell, pluripotent stem cell, multipotent stem cell, mesenchymal stem cell, neuronal stem cell, hematopoietic stem cell, pancreatic stem cell, cardiac stem cell, embryonic stem cell, embryonic germ cell, neural crest stem cell, kidney stem cell, hepatic stem cell, lung stem cell, hemangioblast cell, and endothelial progenitor cell.
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104. The composition of claim 96, wherein the progenitor cell is derived from a de-differentiated chondrogenic cell, myogenic cell, osteogenic cell, tendogenic cell, ligamentogenic cell, adipogenic cell, and dermatogenic cell.
- 15 105. The composition of claim 96, wherein said progenitor cell is pre-coated with a linker.
106. The composition of claim 105, wherein said linker is selected from protein G and protein A.
107. The composition of claim 105, wherein said linker is modified with a lipophilic moiety.
- 20 108. The composition of claim 107, wherein said lipophilic moiety is selected from palmitoyl moiety, myristoyl moiety, margaroyl moiety, stearoyl moiety, arachidoyl moiety, acetyl moiety, butyryl moiety, hexanoyl moiety, octanoyl moiety, decanoyl moiety, lauroyl moiety, palmitoleoyl moiety, behenoyl moiety, and lignoceroyl moiety.
- 25 109. The composition of claim 96, wherein said progenitor cell is directly linked to said targeting moiety.

110. The composition of claim 109, wherein said targeting moiety is modified with a lipophilic moiety.
111. The composition of claim 110, wherein said lipophilic moiety is selected from palmitoyl moiety, myristoyl moiety, margaroyl moiety, stearoyl moiety, arachidoyl moiety, acetyl moiety, butyryl moiety, hexanoyl moiety, octanoyl moiety, decanoyl moiety, lauroyl moiety, palmitoleoyl moiety, behenoyl moiety, and lignoceroyl moiety.
112. The composition of claim 96, wherein said progenitor cell expresses a cell surface marker or an extracellular matrix molecule.
113. The composition of claim 112, wherein said cell surface marker or extracellular matrix molecule is selected from CD4, CD8, CD10, CD30, CD33, CD34, CD38, CD45, CD133, CD146, fetal liver kinase-1 (Flk1), C-Kit, Lin, Mac-1, Sca-1, Stro-1, Thy-1, Collagen types II or IV, O1, O4, N-CAM, p75, and SSEA.
114. The composition of claim 96, wherein said targeting moiety comprises a component of a specific binding pair.
115. The composition of claim 96, wherein said targeting moiety interacts with an epitope intrinsic to the target tissue.
116. The composition of claim 115, wherein the epitope is a protein or carbohydrate epitope of the target tissue.
117. The composition of claim 116, wherein the carbohydrate epitope is within a complex carbohydrate.
118. The composition of claim 117, wherein the complex carbohydrate binds to a lectin.

119. The composition of claim 117, wherein the complex carbohydrate is a proteoglycan.
120. The composition of claim 119, wherein the proteoglycan is selected from the group consisting of chondroitin sulfate, dermatan sulfate, heparin, heparan sulfate, hyaluronate, and keratan sulfate.
121. The composition of claim 96, wherein said targeting moiety comprises a homing peptide.
122. The composition of claim 121, wherein said homing peptide comprises a sequence selected from PWERSL, FMLRDR, and SGLRQR, and target to bone marrow tissues.
123. The composition of claim 122, wherein said homing peptide comprises a sequence of ASSLNIA, and targets to muscle tissues.
124. The composition of claim 121, wherein said homing peptide comprises a sequence of YSGKWGW, and targets to intestine.
125. The composition of claim 121, wherein said homing peptide comprises a sequence selected from CGFELETC and CGFECVRQCPERC, and targets to lung tissues.
126. The composition of claim 121, wherein said homing peptide selectively directs the progenitor cell to the target tissue.
127. The composition of claim 96, wherein said targeting moiety comprises an antibody.
128. The composition of claim 127, wherein said antibody is selected from antibodies to type II collagen, chondroitin-4-sulfate, and dermatan sulfate.

129. The composition of claim 127, wherein said antibody is selected from antibodies to collagens I, V, VI and IX, and chondroitin-6-sulfate.
130. The composition claim of 127, wherein said antibody is a monoclonal antibody.
- 5 131. The composition of claim 127, wherein said antibody is a polyclonal antibody.
132. The composition of claim 127, wherein said antibody is a humanized antibody.
- 10 133. The composition of claim 96, wherein said targeting moiety is a fusion protein.
134. The composition of claim 133, wherein said fusion protein comprises an Fc fragment.
135. The composition of claim 133, wherein said fusion protein comprises a homing peptide.
- 15 136. The composition of claim 96, wherein said targeting moiety comprises a receptor or a ligand.
137. The composition of claim 136, wherein said receptor is a chemokine receptor.
- 20 138. The composition of claim 96, wherein said targeting moiety comprises an aptamer.
139. The composition of claim 96, wherein said targeting moiety is a peptidomimetic.

140. The composition of claim 96, wherein the target tissue is selected from neuronal tissue, connective tissue, hepatic tissue, pancreatic tissue, kidney tissue, bone marrow tissue, cardiac tissue, retinal tissue, intestinal tissue, lung tissue, and endothelium tissue.
- 5 141. The composition of claim 96, wherein the target tissue is selected from cartilage, skeletal muscle, cardiac muscle, and smooth muscle, bone, tendon, ligament, adipose tissue, and skin.
142. A method of delivering a scaffold graft in a target tissue, comprising:
- 10 a) linking a progenitor cell to a targeting moiety that binds to a target tissue;
- b) seeding the progenitor cell from (a) onto a biocompatible scaffold, thereby forming a scaffold graft; and
- c) implanting the scaffold graft from (b) in direct contact with, or adjacent to, a target tissue for a sufficient time,
- 15 wherein cells of the target tissue associate with the implanted scaffold graft, thereby to form new tissue.
143. The method of claim 142, wherein the scaffold comprises a bioresorbable material.
144. The method of claim 143, wherein the bioresorbable material comprises at least one molecule selected from hydroxy acid, glycolic acid, caprolactone,
- 20 hydroxybutyrate, dioxanone, orthoester, orthocarbonate, aminocarbonate, collagen, cellulose, fibrin, hyaluronic acid, fibronectin, and chitosan.
145. The method of claim 142, wherein the scaffold comprises a non-bioresorbable material.
146. The method of claim 145, wherein the non-bioresorbable material comprises at least one molecule selected from polyalkylene terephthalate, polyamide,
- 25 polyalkene, poly(vinyl fluoride), polytetrafluoroethylene carbon fibers, natural or synthetic silk, carbon fiber, and glass.

147. The method of claim 142, wherein the progenitor cell is selected from the group consisting of a totipotent stem cell, pluripotent stem cell, multipotent stem cell, mesenchymal stem cell, neuronal stem cell, hematopoietic stem cell, pancreatic stem cell, cardiac stem cell, embryonic stem cell, embryonic germ cell, neural crest stem cell, kidney stem cell, hepatic stem cell, lung stem cell, hemangioblast cell, and endothelial progenitor cell.
148. The method of claim 142, wherein the progenitor cell is derived from a de-differentiated chondrogenic cell, myogenic cell, osteogenic cell, tendogenic cell, ligamentogenic cell, adipogenic cell, and dermatogenic cell.
149. The method of claim 142, wherein said progenitor cell is pre-coated with a linker.
150. The method of claim 149, wherein said linker is selected from protein G and protein A.
151. The method of claim 149, wherein said linker is modified with a lipophilic moiety.
152. The method of claim 151, wherein said lipophilic moiety is selected from palmitoyl moiety, myristoyl moiety, margaroyl moiety, stearoyl moiety, arachidoyl moiety, acetyl moiety, butyryl moiety, hexanoyl moiety, octanoyl moiety, decanoyl moiety, lauroyl moiety, palmitoleoyl moiety, behenoyl moiety, and lignoceroyl moiety.
153. The method of claim 142, wherein said progenitor cell is directly linked to said targeting moiety.
154. The method of claim 153, wherein said targeting moiety is modified with a lipophilic moiety.

155. The method of claim 154, wherein said lipophilic moiety is selected from palmitoyl moiety, myristoyl moiety, margaroyl moiety, stearoyl moiety, arachidoyl moiety, acetyl moiety, butyryl moiety, hexanoyl moiety, octanoyl moiety, decanoyl moiety, lauroyl moiety, palmitoleoyl moiety, behenoyl moiety, and lignoceroyl moiety.
156. The method of claim 142, wherein said progenitor cell expresses a cell surface marker or an extracellular matrix molecule.
157. The method of claim 156, wherein said cell surface marker or extracellular matrix molecule is selected from CD4, CD8, CD10, CD30, CD33, CD34, CD38, CD45, CD133, CD146, fetal liver kinase-1 (Flk1), C-Kit, Lin, Mac-1, Sca-1, Stro-1, Thy-1, Collagen types II or IV, O1, O4, N-CAM, p75, and SSEA.
158. The method of claim 142, wherein said targeting moiety comprises a component of a specific binding pair.
159. The method of claim 142, wherein said targeting moiety interacts with an epitope intrinsic to the target tissue.
160. The method of claim 159 wherein the epitope is a protein or carbohydrate epitope of the target tissue.
161. The method of claim 160, wherein the carbohydrate epitope is within a complex carbohydrate.
162. The method of claim 161, wherein the complex carbohydrate binds to a lectin.
163. The method of claim 161, wherein the complex carbohydrate is a proteoglycan.

164. The composition of claim 163, wherein the proteoglycan is selected from the group consisting of chondroitin sulfate, dermatan sulfate, heparin, heparan sulfate, hyaluronate, and keratan sulfate.
- 5 165. The method of claim 142, wherein said targeting moiety comprises a homing peptide.
166. The method of claim 165, wherein said homing peptide comprises a sequence selected from PWERSL, FMLRDR, and SGLRQR, and target to bone marrow tissues.
- 10 167. The method of claim 165, wherein said homing peptide comprises a sequence of ASSLNIA, and targets to muscle tissues.
168. The method of claim 165, wherein said homing peptide comprises a sequence of YSGKWGW, and targets to intestine.
- 15 169. The method of claim 165, wherein said homing peptide comprises a sequence selected from CGFELETC and CGFECVRQCPERC, and targets to lung tissues.
170. The method of claim 165, wherein said homing peptide selectively directs the progenitor cell to the target tissue.
171. The method of claim 142, wherein said targeting moiety comprises an antibody.
- 20 172. The method of claim 171, wherein said antibody is selected from antibodies to type II collagen, chondroitin-4-sulfate, and dermatan sulfate.
173. The method of claim 171, wherein said antibody is selected from antibodies to collagens I, V, VI and IX, and condroitin-6-sulfate.

174. The method claim 171, wherein said antibody is a monoclonal antibody.
175. The method of claim 171, wherein said antibody is a polyclonal antibody.
176. The method of claim 171, wherein said antibody is a humanized antibody.
177. The method of claim 142, wherein said targeting moiety is a fusion protein.
- 5 178. The method of claim 177, wherein said fusion protein comprises an Fc fragment.
179. The method of claim 177, wherein said fusion protein comprises a homing peptide.
180. The method of claim 142, wherein said targeting moiety comprises a
10 receptor or a ligand.
181. The method of claim 180, wherein said receptor is a chemokine receptor.
182. The method of claim 142, wherein said targeting moiety comprises an aptamer.
183. The method of claim 142, wherein said targeting moiety is a peptidomimetic.
- 15 184. The method of claim 142, wherein the target tissue is selected from neuronal tissue, connective tissue, hepatic tissue, pancreatic tissue, kidney tissue, bone marrow tissue, cardiac tissue, retinal tissue, intestinal tissue, lung tissue, and endothelium tissue.
- 20 185. The method of claim 142, wherein the target tissue is selected from cartilage, skeletal muscle, cardiac muscle, and smooth muscle, bone, tendon, ligament, adipose tissue, and skin.

186. The method of claim 142, wherein the scaffold graft comprises a bioactive factor.
187. The method of claim 186, wherein the bioactive factor is selected from a transforming growth factor, a bone morphogenetic protein, a cartilage-
5 derived morphogenic protein, a growth differentiation factor, an angiogenic factor, a platelet-derived growth factor, a vascular endothelial growth factor, an epidermal growth factor, a fibroblast growth factor, a hepatocyte growth factor, an insulin-like growth factor, a nerve growth factor, a colony-stimulating factor, a neurotrophin, a growth hormone, an interleukin, a
10 connective tissue growth factor, a parathyroid hormone-related protein, a chemokine, a Wnt protein, a Noggin, and a Gremlin.
188. The method of claim 142, wherein the scaffold graft is delivered to the target tissue by surgical implantation.
189. The method of claim 142, further comprising removing the scaffold graft
15 from the subject.